*भारतीय मानक*

*Indian Standard*

**IS 2384 : 2023**

# इलेक्ट्रोप्लेटिंग के लिए टिन एनोड — विशिष्टि

*( पहला पुनरीक्षण )*

# Tin Anodes for Electroplating — Specification

*( First Revision )*

ICS 25.220.40

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**November 2023** **Price Group 4**

Corrosion Protection and Finishes Sectional Committee, MTD 24

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Corrosion Protection and Finishes Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard has been formulated with a view to laying down requirements of tin anodes used by electroplaters. Since the impurities in tin used for the manufacture of tin anode will have deleterious effect on the use of anode, limits for these impurities have been specified.

This standard was first published in 1963. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards. In addition to this, major changes compared to previous edition are as follows:

a) Title of standard has been modified;
b) References clause has been added (*see* **2**);
c) Chemical composition clause has been updated (*see* **3**);
d) Packaging clause has been modified (*see* **7**); and
e) BIS certification marking clause has been added (*see* **8.2**).

This standard is one of the series of Indian Standards on anodes for electroplating. Other standards in the series are:

| *IS No.* | *Title* |
|---|---|
| IS 1958 : 1989 | Nickel anodes for electroplating — Specification (*second revision*) |
| IS 1959 : 1994 | Silver anodes for electroplating — Specification (*second revision*) |
| IS 2601 : 1987 | Specification for brass anodes for electroplating (*first revision*) |
| IS 2606 : 1987 | Specification for alloy lead anodes for chromium plating (*second revision*) |

Tin is a soft, malleable, ductile, low melting and highly crystalline silvery-white metal. Tin resists corrosion from water, but can be attacked by acids and alkalis. Tin can be highly polished and is used as a protective coat for other metals through the formation of a protective oxide (passivation) layer prevents further oxidation. Tin is non-toxic and it can be plated onto other ferrous (for example, iron and steel) as well as nonferrous metals (for example, copper or nickel). All the above properties make tin a very promising prospect for the manufacture of sacrificial anodes to be used in electroplating applications.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# TIN ANODES FOR ELECTROPLATING — SPECIFICATION

*( First Revision )*

## 1 SCOPE

This standard lays down the requirements of tin anodes used by electroplaters. Since the impurities in tin used for the manufacture of tin anode will have deleterious effect on the use of anode, limits for these impurities have been specified.

This standard is intended chiefly to cover the technical provisions relating to tin anodes for electroplating, and it does not include all the necessary provisions of a contract.

## 2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

| *IS No.* | *Title* |
|---|---|
| IS 26 : 1992 | Tin ingot — Specification (*fourth revision*) |
| IS 1940 : 1969 | Methods of chemical analysis of tin ingot (*first revision*) |

## 3 CHEMICAL COMPOSITION

**3.1** The chemical analysis of tin anodes when carried out by the method specified in IS 1940 or any other established instrumental/chemical methods shall be as per chemical composition of tin ingots given in IS 26. In case of dispute, the procedure given in IS 1940 shall be referee method. However, where the method is not given in IS 1940, the referee method shall be agreed to between purchaser and the manufacturer.

**3.2** The tin anodes shall contain not less than 99.75 percent of tin. The amount of impurities present in tin anodes shall not exceed the limits as per chemical composition prescribed in IS 26.

## 4 SHAPE AND SIZE

**4.1** The anodes shall be in the form of rectangular plates or of oval shape or of any other suitable shape and dimension as agreed to between the purchaser and the supplier. The dimensions and tolerances of the tin anodes, including length, width, thickness, and any specific geometrical features, shall be as agreed to between the purchaser and the supplier.

## 5 MANUFACTURE, WORKMANSHIP AND FINISH

**5.1** The anodes, in their finished condition, shall be free from dirt, foreign matter and surface irregularities.

### 5.2 Visual Inspection

Each anode shall undergo a visual inspection to ensure the absence of defects, cracks, and surface contaminants that could affect electroplating quality.

## 6 SAMPLING

Sampling of tin anodes for acceptance purposes shall be as agreed to between the manufacturer and the purchaser. A recommended sampling procedure is given in Annex A.

## 7 PACKAGING

**7.1** Unless otherwise specified, anodes shall be properly separated according to their sizes and shall be packed in such a manner as to ensure safe transportation to the point of delivery. Wherever practicable, not more than one size of anodes shall be packed in a single container.

**7.2** Each packaging shall be marked legibly with the following information:

a) The name, initials or trade-mark of the manufacturer;
b) Material of anode and its purity;
c) Month and year of manufacture;
d) Dimensions/size of anode;
e) Lot or batch number of manufacture;
f) Quantity of anodes in the package; and
g) Any other information relating to retention of quality of the anode at the customer's end including guidelines regarding storage.

## 8 MARKING

**8.1** The name, initials or trade-mark of the manufacturer shall be legibly marked near the hooks of the anodes as the lower parts are liable to be consumed is usage.

### 8.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

## ANNEX A

(*Clause* 6)

## SAMPLING PROCEDURE FOR TIN ANODES FOR ELECTROPLATING

### A-1 LOT

In any consignment all the tin anodes of the same type and manufactured under similar conditions of production shall be grouped together to constitute a lot.

### A-2 SCALE OF SAMPLING

The number of anodes to be selected at random from the lot shall depend upon its lot size and shall be as given in Table 2.

**Table 2 Sampling Criterion**

(*Clause* A-2)

| Sl No.<br>(1) | No. of Anodes in the Lot<br>(2) | No. of Anodes to be Selected<br>(3) |
|---|---|---|
| i) | Up to 25 | 2 |
| ii) | 26 to 50 | 3 |
| iii) | 51 to 100 | 4 |
| iv) | 101 to 200 | 5 |
| v) | 201 to 300 | 7 |
| vi) | 301 and above | 10 |

### A-3 DRILLINGS

**A-3.1** From each anode selected as in **A-2**, drillings shall be obtained from not fewer than three widely-spaced positions. These drillings shall be obtained in the manner specified in **A-3.2** and drillings from each anode shall be stored separately.

**A-3.2** Selected a sharpened twist drill (6 mm to 10 mm drill should be suitable). Thoroughly clean the drill in light petroleum and wipe clean with muslin. Free the anode from any loose impurity by means of a steel wire brush. Bore the holes to approximately 10 percent of the thickness of the anode and discard the drillings therefrom. Place the anode on a clean tinned iron sheet and drill a further 80 percent of the thickness. Collect the drillings thus obtained and transfer to a clean container. If a larger quantity of drillings is required, more holes may be drilled as described above. Before analyzing, the drillings should be washed in light petroleum.

### A-4 NUMBER OF TESTS

The drillings from each anode selected in accordance with **A-2** shall be separately tested for requirements mentioned in **3**.

### A-5 CRITERION OF CONFORMITY

From the test results for each of the characteristics, the average and the range shall be calculated and the lot shall be considered as conforming to the requirements of this specification if the conditions mentioned below are satisfied for each characteristic:

a) If the maximum limit is specified, then (average + 0.6 range) shall be less than or equal to the limit specified; and

b) If the minimum limit is specified, then (average – 0.6 range) shall be greater than or equal to the limit specified.

## ANNEX B

(*Foreword*)

## COMMITTEE COMPOSITION

Corrosion Protection and Finishes Sectional Committee, MTD 24

| *Organization* | *Representative* |
|---|---|
| Homi Bhabha National Institute, Mumbai | Dr U. Kamachi Mudali **(*Chairperson*)** |
| Bhabha Atomic Research Centre, Mumbai | Shri Supratik Roychowdhary<br>Shri Parag Ahmedbadi (*Alternate* I)<br>Shri Saradi Gumma (*Alternate* II) |
| Bharat Heavy Electrical Limited, Hyderabad | Dr A. K. Maiti<br>Shri Rahul Kashyap (*Alternate*) |
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| CSIR − National Metallurgical Laboratory, Jamshedpur | Dr S. K. Tiwari<br>Dr Raghuvir Singh (*Alternate*) |
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| GAIL (India) Limited, New Delhi | Shri Shiv Shanker Verma<br>Shri Upendra Nath Bhaskar (*Alternate* I)<br>Shri Mohammad Shums Abbas (*Alternate* II) |
| Indian Lead Zinc Development Association, New Delhi | Shri K. Sridhar<br>Shri L. Pugazhenthy (*Alternate*) |
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| NACE International Gateway India Section, Mumbai | Shri K. B. Singh<br>Shri Sumeet Kataria (*Alternate*) |
| National Thermal Power Corporation Limited, New Delhi | Shri Sudhakar Panjala<br>Shri Chander Shekhar (*Alternate*) |

| *Organization* | *Representative* |
|---|---|
| Naval Materials Research Laboratory, Thane | Dr G. Gunasekaran |
| Oil and Natural Gas Corporation Limited, Mumbai | Shrimati Maushumi K. |
| Steel Authority of India Limited (SAIL), Research & Development Centre for Iron & Steel, Ranchi | Dr P. Saravanan<br>Shrimati B. Khalkho (*Alternate*) |
| Tata Steel Limited, Jamshedpur | Dr A. N. Bhagat<br>Dr Tapan Kumar Rout (*Alternate*) |
| BIS Directorate General | Shri Sanjiv Maini, Scientist 'F'/Senior Director and Head (Metallurgical Engineering) [Representing Director General (*Ex-officio*)] |

*Member Secretary*
Shri Dushyant Hawelikar
Scientist 'B'/Assistant Director
(Metallurgical Engineering), BIS

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## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
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